

4.0 MODEL OPTIONS AND METEOROLOGY

USEPA's ISCST3 dispersion model (December 1998; Version 98356) is used to determine ambient concentrations of each of the six toxins at the receptors described in Section 3, and illustrated in Figure 3.1. The input options are presented in the following sections.

The ISCST3 model is appropriate for determining ambient impacts in both simple and complex terrain from multiple sources subject to building downwash effects. For this analysis, the terrain within a square mile segment is likely to be approximately flat; therefore simple terrain is assumed. The equipment operating at the wells will not be large enough to result in significant building downwash, therefore no building downwash is simulated and wake effects are not considered.

4.1 Model Input Options

The ISCST3 User's Guide provides detailed explanations of the modeling options. The following options will be incorporated into the modeling runs:

- I. The regulatory default options:
 - a. Stack-tip downwash (except for Schulman-Scire downwash).
 - b. Buoyancy-induced dispersion (except for Schulman-Scire downwash).
 - c. No gradual plume rise.
 - d. Calms processing routine.
 - e. Default wind speed profile exponents.
 - f. Default vertical potential temperature gradients.
 - g. Upper-bound concentration estimates for sources influenced by building downwash from super-squat buildings.
- II. Rural dispersion parameters

In order to classify the land use type in the vicinity of the Pinedale Anticline Project, land use within three kilometers of the proposed site is classified according to the method developed by Auer (1978). Although a formal analysis was not conducted, it is clear that the surrounding area is rural. Rural dispersion coefficients were thus used in the modeling analysis.

4.2 Meteorology

Meteorological data representative of the proposed site are required as input to the ISCST3 dispersion model to estimate ambient impacts. To meet this requirement, an on-site data set was generated by CALMET for a location within the Pinedale Anticline Project Area (PAPA). This data set was derived from the meteorological data used as input to the CALPUFF modeling runs for prediction of criteria pollutant impacts. (See Figure 4.1 for this data set location.)

All hours with wind speeds less than 0.5 meters per second (m/s) are represented as calm hours in the model run. Federal modeling guidance (Guideline on Air Quality Models, Appendix W to 40 CFR Part 51) states that "a Gaussian plume model does not apply during calm [less than 1 m/s] conditions..." (Section 9.3.4.1). The guidance also states that hours with measured wind speeds below the measurement threshold of the anemometer should be modified to indicate calm hours (Section 9.3.4.2). However, there is no specific guidance related to meteorological data created by the CALPUFF model. Because many data sets with varying anemometer thresholds were used to create the data set summarized herein, these data were processed assuming that hours with wind speeds less than 0.5 m/s represent calm hours. Therefore, for hours with wind speeds between 0.5 m/s and 1 m/s, ISCST3 calculates the pollutant concentration assuming 1 m/s. The wind rose (Figure 4.2) reflects this assumption, and summarizes all hours with wind speeds less than 0.5 m/s as calm hours.

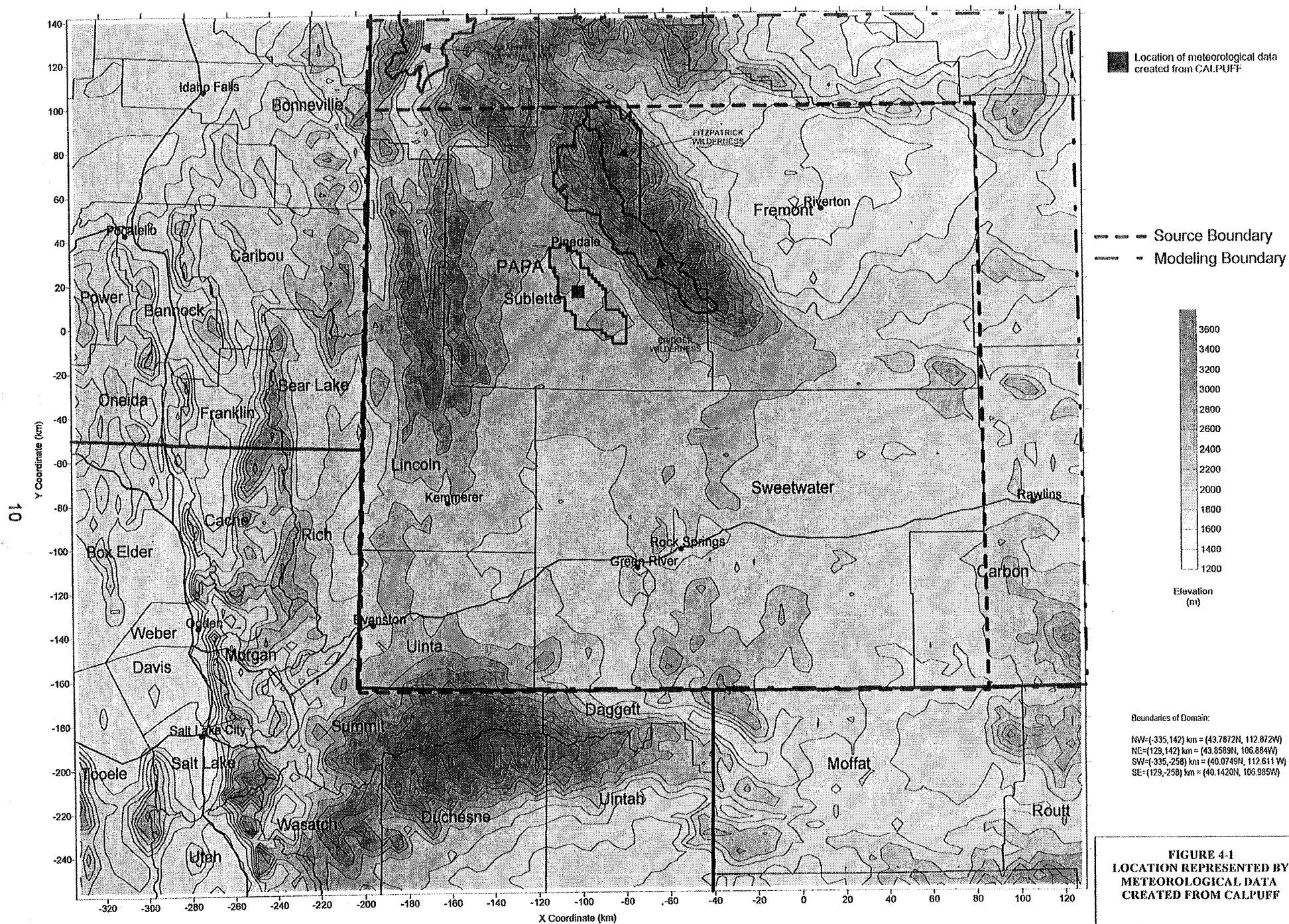
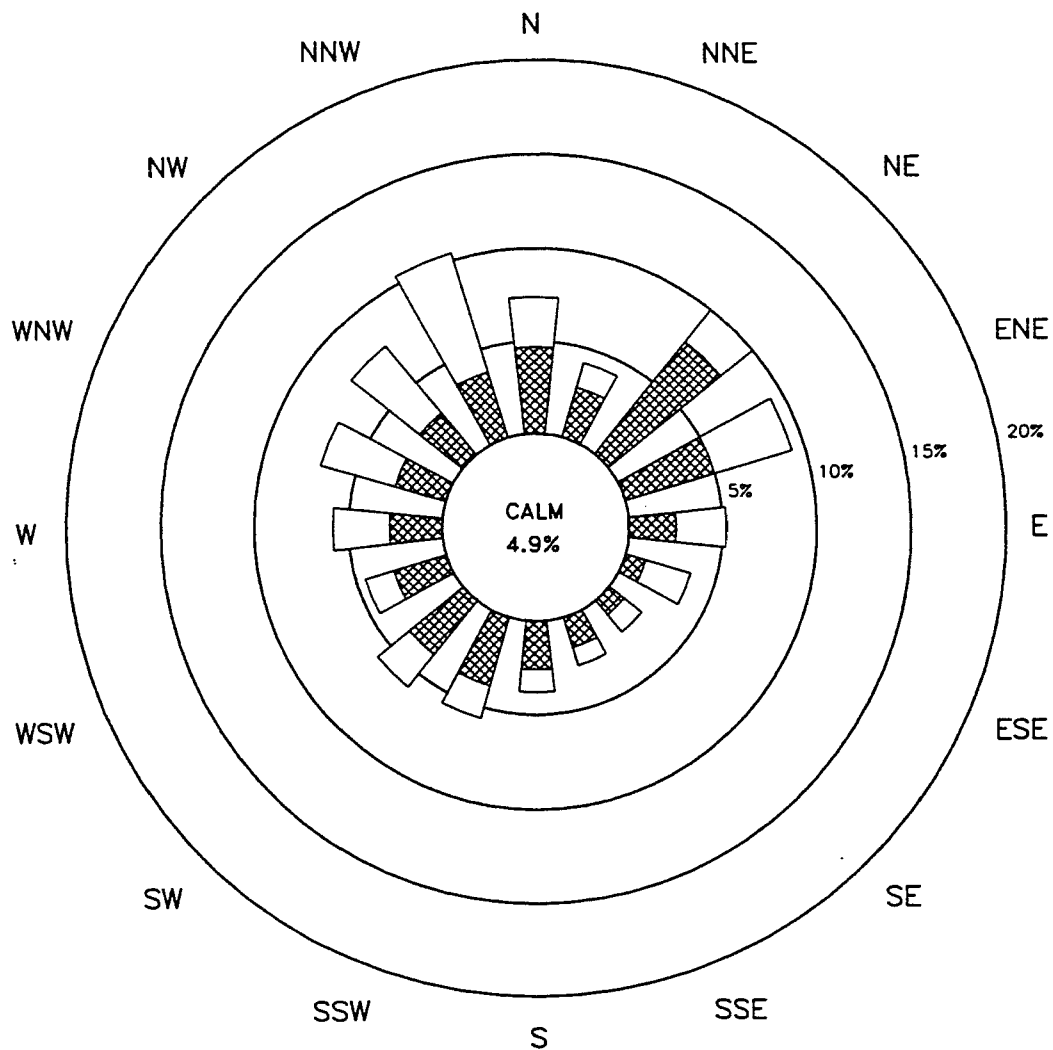


FIGURE 4-1
LOCATION REPRESENTED BY
METEOROLOGICAL DATA
CREATED FROM CALPUFF

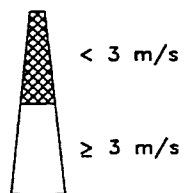


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AVERAGE WIND SPEED = 3.1 m/s

LEGEND



CALMS ARE WINDS WITH SPEEDS LESS THAN 0.5 m/s

SHOWN AS DIRECTION FROM WHICH WIND IS BLOWING

FIGURE 4.2 WIND FREQUENCY DISTRIBUTION

PINEDALE ANTICLINE PROJECT

JANUARY 1, 1995 - DECEMBER 31, 1995



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The meteorological data are summarized in Table 4.1 (a frequency distribution of wind speed by direction) and in Figure 4.2 (a wind rose of the wind data). The data show a peak from the north-northwest (10.4 percent of all winds) with a secondary peak from the northeast (10.0 percent of all winds). The meteorological data show 4.9 percent calm wind conditions (less than 0.5 m/s) and an average wind speed of 3.1 m/s.

TABLE 4.1
FREQUENCY OF WINDS BY DIRECTION AND SPEED
January 1, 1995 - December 31, 1995
(percent of occurrence)

Direction	Speed Class Intervals (m/s)						Mean Speed	
	1.0<1.5	1.5,<3	3,<5	5,<7	7,<10	≥10		All
N		2.0	2.7	2.0	0.6	0.2	0.0	7.4
NNE		1.4	1.4	0.9	0.2	0.2	0.0	4.2
NE		4.4	3.4	1.3	0.5	0.4	0.0	10.0
ENE		2.2	2.8	1.7	1.0	1.4	0.2	9.3
E		0.3	2.2	1.7	0.6	0.3	0.0	5.2
ESE		0.2	0.9	1.7	0.6	0.2	0.1	3.6
SE		0.1	0.9	0.8	0.3	0.1	0.0	2.2
SSE		0.4	1.3	1.0	0.0	0.0	0.0	2.7
S		0.6	2.0	1.1	0.1	0.0	0.0	3.8
SSW		1.6	2.2	1.6	0.1	0.0	0.0	5.6
SW		2.1	1.9	1.5	0.3	0.0	0.0	5.9
WSW		1.2	1.7	1.4	0.3	0.0	0.0	4.5
W		0.8	2.0	2.5	0.4	0.0	0.0	5.8
WNW		0.7	2.1	3.0	1.2	0.0	0.0	6.9
NW		0.9	2.0	3.4	1.2	0.2	0.0	7.6
NNW		1.6	2.1	4.0	2.2	0.4	0.0	10.4
All		20.5	31.8	29.6	9.5	3.3	0.3	95.1

Calm (< 0.5 m/s) = 4.9 percent
Mean wind speed (only non-calms) = 3.1 m/s